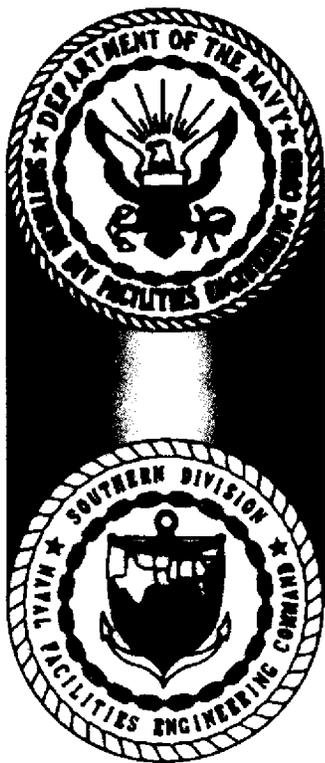


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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT
ADDENDUM AREA OF CONCERN 528 (AOC 528) ZONE E CNC CHARLESTON SC
7/30/2002
CH2M HILL

RFI REPORT ADDENDUM

Area of Concern 528. Zone E



***Charleston Naval Complex
North Charleston, South Carolina***

SUBMITTED TO
***U.S. Navy Southern Division
Naval Facilities Engineering Command***

CH2M Jones

July 2002

Contract N62467-99-C-0960



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July 30, 2002

Mr. David Scaturo
South Carolina Department of Health and
Environmental Control
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Re: RFI Report Addendum (Revision 0) – AOC 528, Zone E

Dear Mr. Scaturo:

Enclosed please find four copies of the RFI Report Addendum (Revision 0) for AOC 528 in Zone E of the Charleston Naval Complex (CNC). This report has been prepared pursuant to agreements by the CNC BRAC Cleanup Team for completing the RCRA Corrective Action process.

The principal author of this document is Sam Naik. Please do not hesitate to contact him at 770/604-9182, extension 255, should you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

cc: Rob Harrell/Navy, w/att
Gary Foster/CH2M HILL, w/att

RFI REPORT ADDENDUM

Area of Concern 528, Zone E



*Charleston Naval Complex
North Charleston, South Carolina*

SUBMITTED TO
*U.S. Navy Southern Division
Naval Facilities Engineering Command*

PREPARED BY
CH2M-Jones

July 2002

*Revision 0
Contract N62467-99-C-0960
158814.ZE.PR.01*

**Certification Page for RFI Report Addendum (Revision 0) –
AOC 528, Zone E**

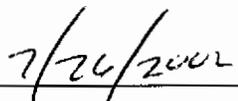
I, Dean Williamson, certify that this report has been prepared under my direct supervision. The data and information are, to the best of my knowledge, accurate and correct, and the report has been prepared in accordance with current standards of practice for engineering.

South Carolina

P.E. No. 21428



Dean Williamson, P.E.


Date

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16		(EnSafe, 1997)	

1 **Acronyms and Abbreviations**

2	AOC	Area of concern
3	AST	Aboveground storage tank
4	BCT	BRAC Cleanup Team
5	BRAC	Base Realignment and Closure Act
6	BRC	Background reference concentration
7	CA	Corrective action
8	CMS	Corrective measures study
9	CNC	Charleston Naval Complex
10	COC	Chemical of concern
11	COPC	Chemical of potential concern
12	CSI	Confirmatory sampling investigation
13	DAF	Dilution attenuation factor
14	DET	Environmental Detachment Charleston
15	EnSafe	EnSafe Inc.
16	EPA	U.S. Environmental Protection Agency
17	FRE	Fixed-point risk evaluation
18	HHRA	Human health risk assessment
19	IM	Interim measure
20	HI	Hazard index
21	LUC	Land use control
22	MCL	Maximum contaminant level
23	µg/kg	Microgram per kilogram
24	µg/L	Microgram per liter
25	NAVBASE	Naval Base
26	NFA	No further action
27	OP	Organo-phosphorus
28	OWS	Oil/water separator
29	PCB	Polychlorinated biphenyl
30	RBC	Risk-based concentration

1 **Acronyms and Abbreviations, Continued**

2	RCRA	Resource Conservation and Recovery Act
3	RFI	RCRA Facility Investigation
4	SCDHEC	South Carolina Department of Health and Environmental Control
5	SSL	Soil screening level
6	SVOC	Semivolatile organic compound
7	SWMU	Solid waste management unit
8	TDS	Total dissolved solids
9	UST	Underground storage tank
10	VOC	Volatile organic compound

1.0 Introduction

2 In 1993, Naval Base (NAVBASE) Charleston was added to the list of bases scheduled for
3 closure as part of the Defense Base Realignment and Closure Act (BRAC), which regulates
4 closure and transition of property to the community. The Charleston Naval Complex (CNC)
5 was formed as a result of the dis-establishment of the Charleston Naval Shipyard and
6 NAVBASE on April 1, 1996.

7 Corrective Action (CA) activities are being conducted under the Resource Conservation and
8 Recovery Act (RCRA) with the South Carolina Department of Health and Environmental
9 Control (SCDHEC) as the lead agency for CA activities at the CNC. All RCRA CA activities
10 are performed in accordance with the Final Permit (Permit No. SC0 170 022 560).

11 In April 2000, CH2M-Jones was awarded a contract to provide environmental investigation
12 and remediation services at the CNC. This submittal has been prepared by CH2M-Jones to
13 complete the RCRA Facility Investigation (RFI) for Area of Concern (AOC) 528 in Zone E of
14 CNC. The location of this site in Zone E is shown in Figure 1-1. Figure 1-2 shows an aerial
15 photograph of AOC 528.

1.1 Background

17 AOC 528 consists of a former steam-cleaning shop on the western side of Building 59, and
18 was used to clean boiler parts. Boiler tubes, preserved with Cosmoline® grease to prevent
19 rust, were received at the boiler shop in Building 59. The Cosmoline® was removed by a
20 bath of kerosene, and all remaining grease was removed in another bath of hot water,
21 trisodiumphosphate, caustic, and detergents. After the second bath, the tubes were steam-
22 rinsed at the steam-cleaning shop. Although this operation did not generate hazardous
23 waste, it did produce approximately 800 gallons of contaminated kerosene semi-annually.
24 The contents of the second bath and the steam-cleaning operation were discharged to the
25 sanitary sewer. Before installation of the sanitary sewer, waste was discharged to the
26 Cooper River via the combined sewer system. Currently, Building 59 is used by Metal
27 Trades, Inc. for some metal fabrication, insulation work, and offices. The majority of
28 Building 59 is unoccupied.

29 Materials of concern identified in the *Final Zone E RFI Work Plan, Revision 1* (EnSafe Inc.
30 [EnSafe]/Allen & Hoshall, 1995) include caustics, petroleum hydrocarbons, and kerosene.

1 This area of Zone E is zoned M2 (industrial). The CNC RCRA Permit identified AOC 528 as
2 requiring a Confirmatory Sampling Investigation (CSI).

3 The RFI was initially conducted by the Navy/EnSafe team. RFI activities were documented
4 in the *Zone E RFI Report, Revision 0* (EnSafe, 1997), which was submitted during 1997.

5 Regulatory review was conducted on this document and a draft response to the comments
6 from SCDHEC were prepared by the Navy/EnSafe team.

7 **1.2 Purpose of the RFI Report Addendum**

8 The purpose of this RFI Report Addendum is to document the results of previous RFI
9 investigations conducted by EnSafe at AOC 528. This RFI Report Addendum also discusses
10 various closeout issues and the findings of previous investigations, existing site conditions,
11 and surrounding area land use.

12 Prior to changing the status of any site in the CNC RCRA CA permit, the BRAC Cleanup
13 Team (BCT) agreed that the following issues should be considered:

- 14 • Status of the RFI
- 15 • Presence of metals (inorganics) in groundwater
- 16 • Potential linkage to Solid Waste Management Unit (SWMU) 37, Investigated Sanitary
17 Sewers at the CNC
- 18 • Potential linkage to AOC 699, Investigated Storm Sewers at the CNC
- 19 • Potential linkage of AOC 504, Investigated Railroad Lines at the CNC
- 20 • Potential linkage to surface water bodies (Zone J)
- 21 • Potential contamination associated with oil/water separators (OWSs)
- 22 • Relevance or need for land use controls (LUCs) at the site

23 Information regarding these issues is provided in this RFI Report Addendum to expedite
24 evaluation of closure of the site.

25 **1.3 Report Organization**

26 This RFI Report Addendum consists of the following sections, including this introductory
27 section:

28 **1.0 Introduction** – Presents the purpose of the report and background information relating
29 to the RFI Report Addendum.

- 1 **2.0 Summary of RFI Conclusions for AOC 528** – Summarizes the conclusions from the RFI
2 investigations and risk evaluations for AOC 528 as presented in the *Zone E RFI Report,*
3 *Revision 0.*
- 4 **3.0 Interim Measures and UST/AST Removals** – Provides information regarding any
5 interim measures (IMs), or underground storage tank (UST)/aboveground storage tank
6 (AST) removal activities performed at the site.
- 7 **4.0 Summary of Additional Investigations** – Summarizes information, if any, collected
8 after completion of the RFI report.
- 9 **5.0 COPC/COC Refinement** – Provides further evaluation of chemicals of potential concern
10 (COPC) based on RFI and additional data to assess them as chemicals of concern
11 (COCs).
- 12 **6.0 Summary of Information Related to Site Closeout Issues** – Discusses the various site
13 closeout issues that the BCT agreed to evaluate prior to site closeout.
- 14 **7.0 Recommendations** – Provides recommendations for proceeding with site closure.
- 15 **8.0 References** – Lists the references used in this document.
- 16 **Appendix A** – Contains excerpts from the *Zone E RFI Report, Revision 0,* including a
17 summary of detections of chemicals and a groundwater flow map for the site vicinity.
- 18 **Appendix B** – Contains responses to SCDHEC comments for AOC 528 from the *Zone E RFI*
19 *Report, Revision 0.*
- 20 All tables and figures appear at the end of their respective sections.

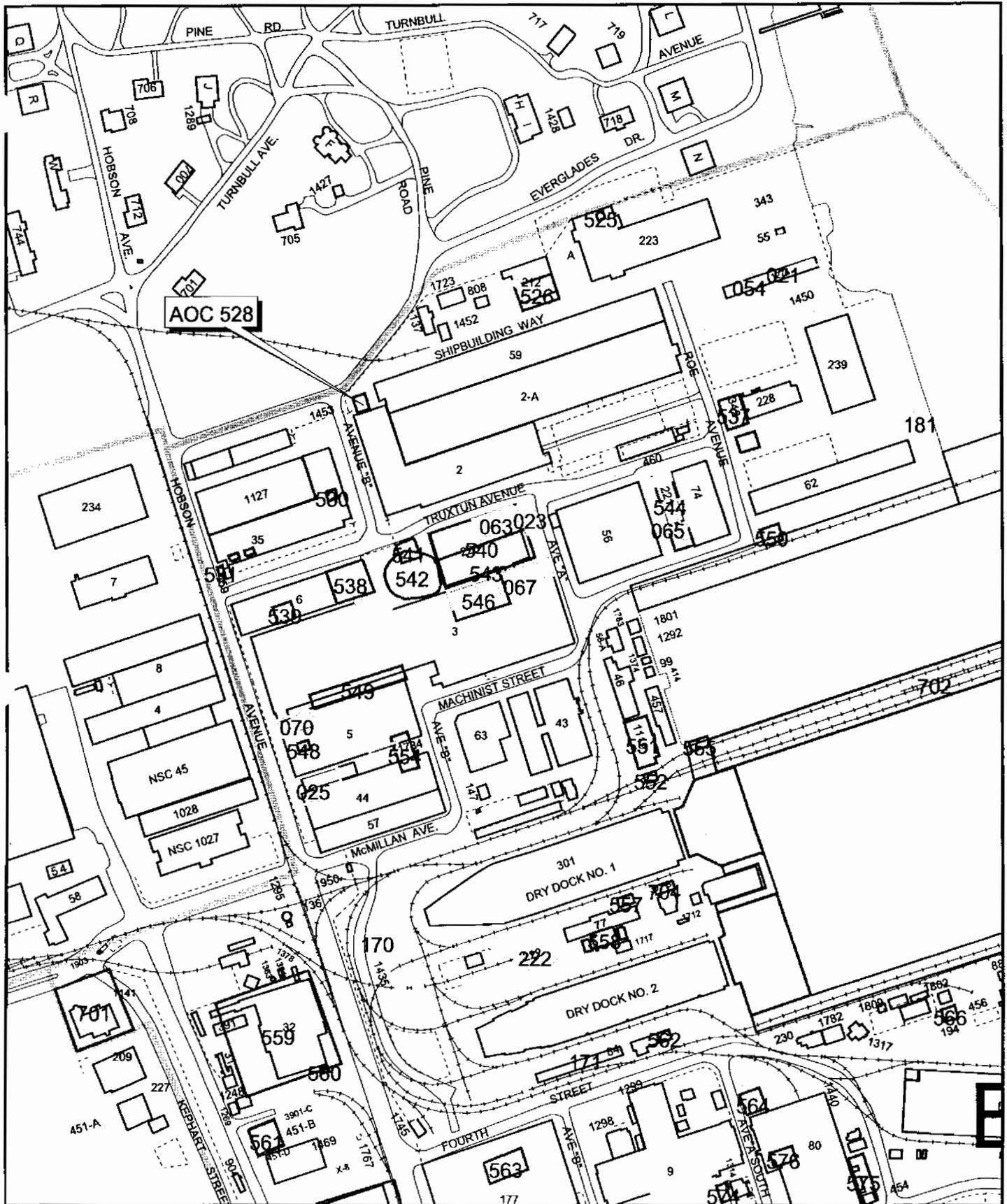


Figure 1-1
 Location of AOC 528 in Zone E
 Charleston Naval Complex



-  Fence
-  Railroads
-  Roads
-  AOC Boundary
-  SWMU Boundary
-  Buildings

 Zone Boundary



0 50 100 Feet

1 inch = 65 feet

Figure 1-2
Aerial Photograph of AOC 528
Charleston Naval Complex

1 **2.0 Summary of RFI Conclusions for AOC 528**

2 This section summarizes the results and conclusions from the soil, groundwater, and
3 sediment investigations conducted at AOC 528 which were reported in the *Zone E RFI*
4 *Report, Revision 0* (EnSafe, 1997). Figure 2-1 shows the soil, groundwater, and sediment
5 sampling locations.

6 As part of the Zone E RFI, soil, groundwater, and sediment investigations were conducted
7 at AOC 528 during the period 1996 to 1997. The RFI report presented the results of these
8 investigations and conclusions concerning contamination and risk, as summarized in the
9 following sections. A further evaluation of the COCs at this site is provided in Section 5.0.

10 **2.1 Soil Sampling and Analysis**

11 The RFI at AOC 528 included a single soil sampling event with collection and analysis of
12 three surface soil and three subsurface soil samples from locations under concrete and
13 asphalt pavement. Figure 2-1 shows the RFI sample locations at AOC 528. Surface soil and
14 subsurface soil samples were also collected from the shallow monitoring well location
15 during well installation. All samples were analyzed for volatile organic compounds (VOCs),
16 semivolatile organic compounds (SVOCs), and pH. These boring locations were identified
17 as E528SB001 through E528SB004. One subsurface soil sample was selected as a duplicate
18 and was also analyzed for herbicides, organo-phosphorus (OP) pesticides, hexavalent
19 chromium, and dioxins. Surface and subsurface samples from one soil boring location were
20 analyzed for organotins, pesticides, metals, and cyanide.

21 **2.1.1 Surface Soil Results**

22 During the RFI, surface soil detections of organic compounds were evaluated against the
23 U.S. Environmental Protection Agency (EPA) Region III industrial risk-based
24 concentrations (RBCs) (with a hazard index [HI]=0.1 for noncarcinogens). Surface soil
25 detections of inorganic compounds were evaluated against the EPA Region III industrial
26 RBCs (HI=0.1 for noncarcinogens) and the Zone E background reference concentrations
27 (BRCs).

28 Detected concentrations of organic and inorganic analytes exceeding their respective criteria
29 are as follows:

- 1 • **VOCs:** There were no VOC detections above laboratory detection limits in surface soil
- 2 samples from AOC 528.
- 3 • **SVOCs:** No SVOC detections exceeded the screening criteria in surface soil.
- 4 • **Inorganics:** No inorganic detections exceeded the screening criteria in surface soils.
- 5 • **Pesticides:** No pesticides were detected above laboratory detection limits on surface soil.
- 6 • **Organotins:** No organotins were detected above laboratory detection limits in surface soil.

7 **2.1.2 Subsurface Soil Results**

8 During the RFI, subsurface soil detections of organic compounds were compared with
9 generic soil screening levels (SSLs) (using a dilution attenuation factor [DAF]=10) and the
10 Zone E BRCs. Subsurface soil detections of inorganic compounds were compared with
11 generic SSLs (using a DAF=10) and the Zone E BRCs.

12 Detected concentrations of organic and inorganic compounds from subsurface soil samples
13 are as follows:

- 14 • **VOCs:** No VOC detections exceeded the screening criteria in subsurface soil.
- 15 • **SVOCs:** No SVOC detections exceeded the screening criteria in subsurface soil.
- 16 • **Dioxins:** The RFI report stated that there were no detections in subsurface soil above the
17 screening criteria for dioxin compounds.
- 18 • **Inorganics:** No inorganic detections exceeded the screening criteria in subsurface soil.
- 19 • **Pesticides:** No pesticides/polychlorinated biphenyls (PCBs) were detected above
20 laboratory detection limits in subsurface soil samples.
- 21 • **Organotins:** No organotins were detected above laboratory detection limits in subsurface
22 soil.

23 **2.2 Groundwater**

24 The RFI investigation for AOC 528 included the installation of one shallow monitoring well,
25 E528GW001, on the east side of the former steam-cleaning operation area. Figure 2-1 shows
26 the location of the well. Groundwater samples were analyzed for VOCs, SVOCs, metals,
27 pH, chlorides, sulfates, and total dissolved solids (TDS). No samples were selected as
28 duplicates at this site.

1 During the RFI, each well was sampled four times between 1996 and 1997. Detections in
2 groundwater samples were compared with the EPA Region III tap water RBCs, maximum
3 contaminant levels (MCLs), and, for inorganics, the Zone E shallow groundwater BRCs.

4 **2.2.1 Shallow Groundwater Results**

5 Analyte concentrations in shallow groundwater samples were detected as follows at this
6 site:

- 7 • **VOCs:** There were no VOC detections above laboratory detection limits in shallow
8 groundwater samples from AOC 528.
- 9 • **SVOCs:** There were no SVOC detections above laboratory detection limits in shallow
10 groundwater samples from AOC 528.
- 11 • **Inorganics:** The *Zone E RFI Report, Revision 0* reported detections in the first sampling
12 event only. Among detected inorganic analytes, one metal exceeded its respective
13 screening criteria:
 - 14 – **Iron:** The RFI report stated that one sample from well E528GW001 during the first
15 sampling event exceeded the tap water RBC for iron of 1,100 micrograms per liter
16 ($\mu\text{g/L}$), at a concentration of 4,410 $\mu\text{g/L}$. No primary MCL has been established for
17 iron, and no shallow groundwater BRC was developed for iron in Zone E during the
18 RFI.

19 **2.3 Sediment**

20 The RFI investigation for AOC 528 included one sediment sample collected at the northwest
21 corner of Building 1453. The sediment sample was analyzed for VOCs, SVOCs, and pH.
22 Figure 2-1 shows the location of the sediment sample. These sediments were found in the
23 storm drain catch basins and are not true sediments collected along surface water bodies.

24 Detections in sediment samples were evaluated during the RFI, against the EPA Region III
25 industrial RBCs (with a HI=0.1 for noncarcinogens).

26 Detected concentrations of organic and inorganic compounds from sediment samples are as
27 follows:

- 28 • **VOCs:** No VOC detections exceeded the screening criteria in sediment samples.
- 29 • **SVOCs:** The RFI report stated that among detected SVOC compounds, elevated benzo[a]
30 pyrene (BEQ) concentrations were detected at a single location. The BEQ calculation
31 was performed using the method adopted by the BCT at the time of the writing of the

1 *Zone E RFI Report, Revision 0.* The calculated BEQ value for two samples ranged from
2 411 micrograms per kilogram ($\mu\text{g}/\text{kg}$) to 2,280 $\mu\text{g}/\text{kg}$. There were no other exceedances
3 of SVOC compounds in sediments above the screening criteria.

- 4 • **Inorganics:** Among detected inorganic analytes, three metals exceeded their respective
5 screening criteria:
 - 6 – **Arsenic** exceeded the industrial soil RBC for iron of 3.8 mg/kg at a concentration of
7 6.6 mg/kg.
 - 8 – **Copper** exceeded the industrial soil RBC for copper of 8,200 mg/kg at a concentration
9 of 134,000 mg/kg.
 - 10 – **Nickel** exceeded the industrial soil RBC for nickel of 4,100 mg/kg at a concentration
11 of 6,480 mg/kg.
- 12 • **Pesticides:** Among detected pesticides, one pesticide exceeded its respective screening
13 criteria:
 - 14 – **Dieldrin** exceeded the industrial soil RBC of 360 $\mu\text{g}/\text{kg}$ for dieldrin at a concentration
15 of 370 $\mu\text{g}/\text{kg}$. No PCBs were detected above laboratory detection limits in sediment
16 samples from AOC 528.

17 Subsequent to the RFI field investigation, the sediments that were present in the floor drain
18 at AOC 528 were addressed in the IM for AOC 699, conducted by the Environmental
19 Detachment Charleston (DET) in 1999. As a result, these sediments are no longer present at
20 this site.

21 **2.4 RFI Human Health Risk Assessment (HHRA)**

22 The RFI report used a fixed-point risk evaluation (FRE) approach at this site. The FRE
23 considered site resident and site worker scenarios during the FRE. The detailed risk
24 assessment for the AOC 528 site is presented in Sections 10.20.8.2 and 10.20.8.3 of the *Zone E*
25 *RFI Report, Revision 0.*

26 **2.4.1 Soils**

27 The HHRA for AOC 528 considered BEQs from AOC 528 as a COC based on one BEQ
28 exceedance of the EPA Region III residential RBC of 88 $\mu\text{g}/\text{kg}$ for benzo[a]pyrene.

29 For the unrestricted future land use scenario, BEQs were retained as a COC for surface soil.
30 For the commercial/industrial reuse scenario, no COCs were identified. The FRE did not
31 identify COCs in subsurface soils at AOC 528.

1 **2.4.2 Groundwater**

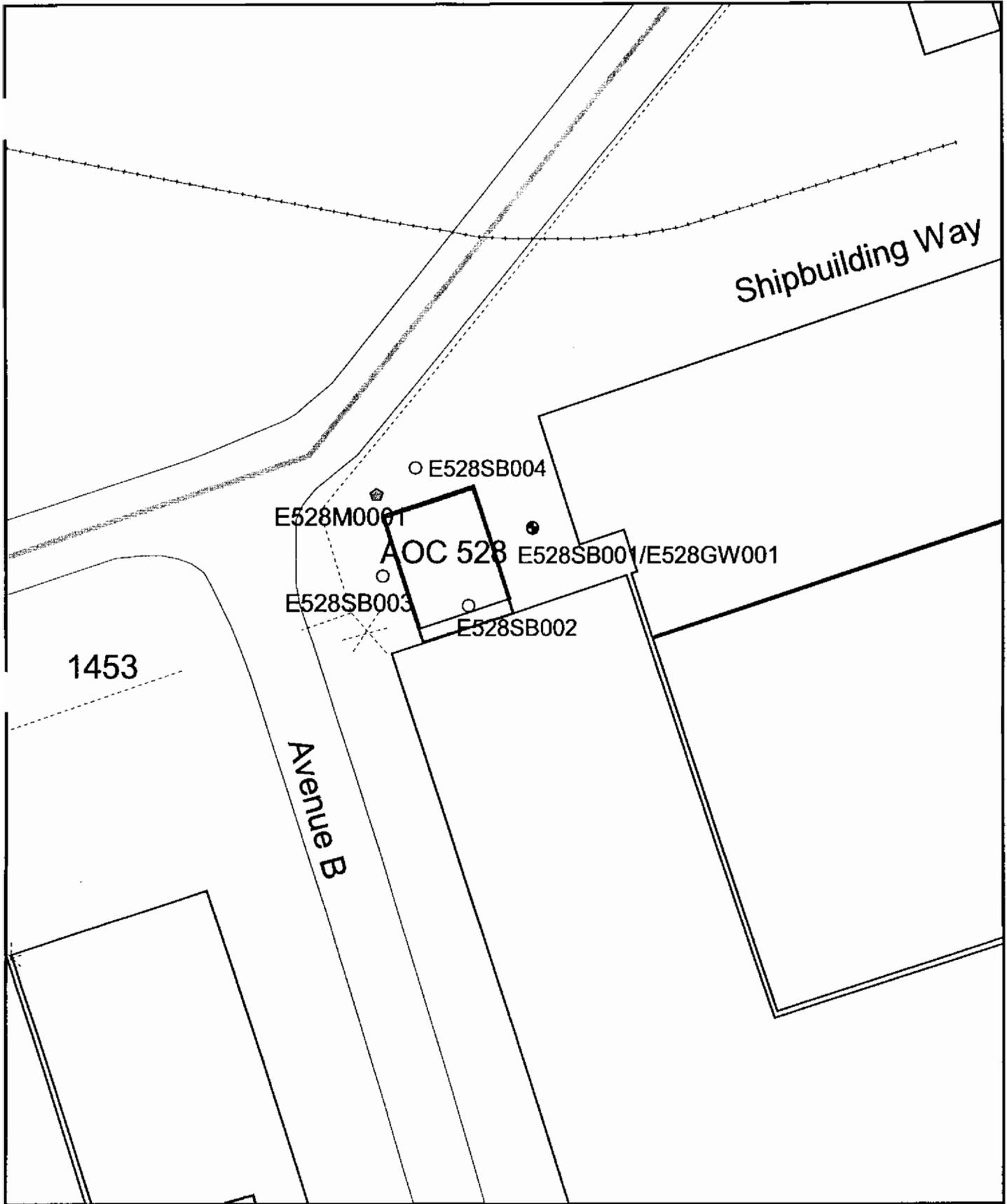
2 The FRE did not identify any COCs in shallow groundwater at AOC 528.

3 **2.4.3 Sediment**

4 Sediments were not addressed in the FRE for AOC 528.

5 **2.5 RFI Conclusions and Recommendations**

6 The *Zone E RFI Report, Revision 0* recommended no further action or corrective measures for
7 soil and groundwater at AOC 528.



- Groundwater Well
- ⊕ Sediment
- Soil Sample
- ≡ Railroads
- ≡ Roads
- AOC Boundary
- SWMU Boundary
- Buildings
- ⋯ Zone Boundary

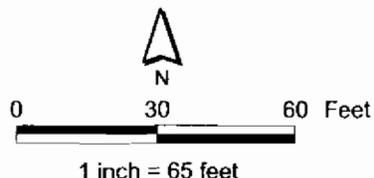


Figure 2-1
RFI Sample Locations
AOC 528
Charleston Naval Complex

1 **3.0 Interim Measures and UST/AST Removals**

2 **3.1 UST/AST Removals**

3 There is no indication of a UST or AST being present at this site.

4 **3.2 Interim Measures**

5 In 1998, an IM was conducted by the DET for AOC 699, which included the storm sewer
6 system associated with AOC 528. The activities conducted for the IM included hydro-blast
7 cleaning of catch basins and associated interconnecting piping in the immediate vicinity of
8 AOC 528. As a result, the sediments that were present in the catch basin at AOC 528 are no
9 longer present at this site. The IM activities are documented in a report titled *Interim*
10 *Measure Completion Report for AOC 699 Storm Drain Cleaning* (DET, 1999).

1 **4.0 Summary of Additional Investigations**

- 2 No additional investigations have been conducted at AOC 528 since the RFI field
3 investigations conducted by EnSafe during the period of 1995-1997.

1 **5.0 COPC/COC Refinement**

2 The *Zone E RFI Report, Revision 0* (EnSafe, 1997) identified BEQs as surface soil COCs for
3 AOC 528 under the future industrial land use scenario. The nature of occurrence and the
4 relevance of these chemicals at these sites are further discussed below.

5 The BCT has agreed that soil VOC detections will be re-screened against generic SSLs, using
6 a DAF=1. No VOCs were detected in soil at this site, therefore no re-screening against SSLs
7 based on a DAF=1 is necessary.

8 **5.1 Surface Soil**

9 **5.1.1 BEQs**

10 The RFI report considered BEQs as COCs in surface soil based on one BEQ exceedance of
11 the EPA Region III residential RBC for benzo[a]pyrene of 88 µg/kg. This exceedance was
12 detected at E528SB002 where the BEQ concentration as calculated during the RFI was 123
13 µg/kg. The BEQ concentration at E528SB002, based on the current method of BEQ
14 calculation adopted by the BCT is 573.02 µg/kg, which is below the CNC surface soil BEQ
15 site-wide reference concentration of 1,304 µg/kg. The BEQ concentration in subsurface soil
16 sample at this location was also below the CNC subsurface soil BEQ site-wide reference
17 concentration of 1,400 µg/kg.

18 BEQ detections in all other surface and subsurface soil samples at this site were all below
19 the laboratory detection limits. No BEQs were detected in groundwater at this site,
20 indicating that BEQs are not a leaching concern at this site.

21 Based on the information presented above, BEQs are not a COC at this site.

6.0 Summary of Information Related to Site Closeout Issues

6.1 RFI Status

The *Zone E RFI Report, Revision 0* (EnSafe, 1997) addressed SWMUs/AOCs within Zone E of the CNC, including AOC 528.

In accordance with the RFI completion process, if a determination of No Further Investigation (NFI) is made upon completion of the RFI, then a site may proceed to either No Further Action (NFA) status or to a Corrective Measures Study (CMS). The RFI for AOC 528 identified BEQs as COCs for surface soil. Based on the discussion presented in Section 5.0 above, BEQs are not considered a COC at AOC 528. No other COCs have been identified at this site for soil, sediment or groundwater. Therefore, this site is recommended for NFA.

The remaining subsections address the issues that the BCT agreed to evaluate prior to site closeout.

6.2 Presence of Inorganics in Groundwater

For the purpose of site closeout documentation, the inorganics in groundwater issue refers to the occasional or intermittent detection of several metals (primarily arsenic, thallium, and antimony) in groundwater at concentrations above the applicable MCL, preceded or followed by detections of these same metals below the MCL or below the practicable quantitation limit.

There were no detections of arsenic in shallow groundwater at the site above the arsenic MCL. There were no detections of thallium or antimony in the shallow well above the laboratory detection limits. Further evaluation of this issue is not warranted.

1 **6.3 Potential Linkage to SWMU 37, Investigated Sanitary**
2 **Sewers at the CNC**

3 As part of the former steam-cleaning operation at this site, a bath of hot water,
4 trisodiumphosphate, caustic, and detergents was regularly discharged to the sanitary
5 sewer. However, there are no data suggesting that there was an impact to the sanitary
6 sewers from this site. Therefore, further evaluation of this issue is not warranted.

7 **6.4 Potential Linkage to AOC 699, Investigated Storm Sewers at**
8 **the CNC**

9 No COCs requiring further evaluation were identified at this site and no data suggest that
10 impacts to the storm sewers have been caused by this site. Based on these findings, futher
11 evaluation of this issue is not warranted.

12 **6.5 Potential Linkage to AOC 504, Investigated Railroad Lines**
13 **at the CNC**

14 The nearest existing railroad line to AOC 528 is approximately 80 feet northeast of the site.
15 There is no known linkage between AOC 528 and the investigated railroad lines of AOC
16 504, so further evaluation of this issue is not warranted.

17 **6.6 Potential Migration Pathways to Surface Water Bodies at**
18 **the CNC**

19 The nearest surface water body to AOC 528 is the Cooper River, which lies approximately
20 1,100 feet northeast of the site. The only potential migration pathway from the site to
21 surface water is via overland flow via stormwater runoff. The entire site is covered with
22 buildings and pavement, which eliminates contact of surface soil with stormwater.
23 Similarly, runoff directed to the storm sewer system, which discharges to the Cooper River,
24 does not contact the surface soil. Since no COCs requiring further evaluation are present at
25 this site, no further evaluation of a potential pathway for contaminant migration via
26 stormwater runoff is warranted.

1 **6.7 Potential Contamination in Oil/Water Separators (OWSs)**

2 There are no OWSs associated with AOC 528. In addition, there is no reference to an OWS
3 at the site in the *Oil Water Separator Data* report, Department of the Navy, September 2000.
4 Therefore, further evaluation of this issue is not warranted.

5 **6.8 Land Use Controls (LUCs)**

6 The RFI Report Addendum screening did not identify any COCs in soil, groundwater, and
7 sediment at AOC 528 for the unrestricted or industrial land use scenarios. Therefore, LUCs
8 are not necessary.

9 However, the BCT has agreed that LUCs will be applied across all of Zone E at the CNC.
10 These LUCs are expected to include, at a minimum, restrictions for future land use to non-
11 residential use only. These LUCs will apply at AOC 528 due to its location within Zone E.

1 **7.0 Recommendations**

2 AOC 528 consists of a former steam-cleaning shop on the western side of Building 59, and
3 was used to clean boiler parts. The site has been out of operation for several years.
4 Currently Building 59 is used by Metal Trades, Inc. for some metal fabrication, insulation
5 work, and offices. The majority of Building 59 is unoccupied.

6 The *Zone E RFI Report, Revision 0* (EnSafe, 1997) identified BEQs in surface soil as COCs for
7 unrestricted land use, and concluded that no further corrective measures are necessary for
8 the AOC 528 site. Further evaluation of COCs as discussed in Section 5.0 indicates that
9 BEQs are not a COC for the unrestricted or industrial land use scenarios at AOC 528. No
10 other COCs have been identified at this site and no further corrective action is necessary.
11 Therefore, this site is recommended for NFA. Because this site is within Zone E, LUCs that
12 are applicable across Zone E will also apply at this location.

13 Once the BCT concurs that NFA is appropriate for the site, a Statement of Basis will be
14 prepared that will be made available for public comment in accordance with SCDHEC
15 policy. This will allow for public participation in the final remedy selection.

Section 8.0

1 8.0 References

- 2 EnSafe Inc. *Zone E RFI Report, Revision 0, NAVBASE Charleston.* 1997.
- 3 EnSafe Inc./Allen & Hoshall. *Final RCRA Facility Assessment, NAVBASE Charleston.* July
4 1995.
- 5 EnSafe Inc./Allen & Hoshall. *Final Zone E RFI Work Plan, Revision 1, NAVBASE Charleston.*
6 June 1995.
- 7 South Carolina Department of Health and Environmental Control, Final RCRA Part B
8 Permit No. SC0 170 022 560
- 9 U.S. Naval Detachment. *Interim Measure Completion Report for AOC 699 Storm Drain*
10 *Cleaning.* March 4, 1999.

Table 10.20.A
 Chemicals Present in Site Samples
 AOC 528 - Surface Soil
 NAVBASE - Charleston, Zone E
 Charleston, South Carolina

Parameter	Frequency of Detection		Range of Detection		Average Detected Concentration	Range of SQL		Screening Concentration			Units	Number Exceeding		
								Residential RBC	Industrial RBC	Reference		Res.	Ind.	Ref.
Carcinogenic PAHs														
B(a)P Equiv.	*	1	4	123.02	123.02	123.02	1594.59	1802.58	88	780	NA	UG/KG	1	
Benzo(a)anthracene		1	4	110	110	110	690	780	880	7800	NA	UG/KG		
Chrysene		1	4	120	120	120	690	780	88000	780000	NA	UG/KG		
Benzo(k)fluoranthene		1	4	190	190	190	690	780	8800	78000	NA	UG/KG		
Benzo(a)pyrene		1	4	110	110	110	690	780	880	780	NA	UG/KG		
Inorganics														
Aluminum (Al)		1	1	4310	4310	4310	NA	NA	7800	100000	26600	MG/KG		
Arsenic (As)		1	1	2.8	2.8	2.8	NA	NA	0.38	3.8	23.9	MG/KG		
Barium (Ba)		1	1	23.3	23.3	23.3	NA	NA	550	14000	130	MG/KG		
Beryllium (Be)		1	1	0.37	0.37	0.37	NA	NA	0.15	1.3	1.7	MG/KG		
Cadmium (Cd)		1	1	0.42	0.42	0.42	NA	NA	3.9	100	1.5	MG/KG		
Calcium (Ca)	N	1	1	55300	55300	55300	NA	NA	NA	NA	NA	MG/KG		
Chromium (Cr)		1	1	9.4	9.4	9.4	NA	NA	39	1000	94.6	MG/KG		
Cobalt (Co)		1	1	3.2	3.2	3.2	NA	NA	470	12000	19	MG/KG		
Copper (Cu)		1	1	161	161	161	NA	NA	310	8200	66	MG/KG		1
Iron (Fe)	N	1	1	3620	3620	3620	NA	NA	NA	NA	NA	MG/KG		
Lead (Pb)		1	1	52	52	52	NA	NA	400	1300	265	MG/KG		
Magnesium (Mg)	N	1	1	741	741	741	NA	NA	NA	NA	NA	MG/KG		
Manganese (Mn)		1	1	132	132	132	NA	NA	180	4700	302	MG/KG		
Mercury (Hg)		1	1	0.13	0.13	0.13	NA	NA	2.3	61	2.6	MG/KG		
Nickel (Ni)		1	1	11.2	11.2	11.2	NA	NA	160	4100	77.1	MG/KG		
Sodium (Na)	N	1	1	62.1	62.1	62.1	NA	NA	NA	NA	NA	MG/KG		
Tin (Sn)		1	1	14.1	14.1	14.1	NA	NA	4700	6100	59.4	MG/KG		
Vanadium (V)		1	1	5.2	5.2	5.2	NA	NA	55	1400	94.3	MG/KG		
Zinc (Zn)		1	1	99	99	99	NA	NA	2300	61000	827	MG/KG		
Semivolatiles Organics														
Butylbenzylphthalate		1	4	160	160	160	690	750	1600000	41000000	NA	UG/KG		
Fluoranthene		1	4	220	220	220	690	780	310000	8200000	NA	UG/KG		
Phenanthrene		1	4	90	90	90	690	780	310000	8200000	NA	UG/KG		
Pyrene		1	4	190	190	190	690	780	230000	6100000	NA	UG/KG		

* - Identified as a residential COPC
 N - Essential nutrient
 SQL - Sample quantitation limit
 NA - Not applicable
 UG/KG - Micrograms per kilograms
 MG/KG - Milligrams per kilograms

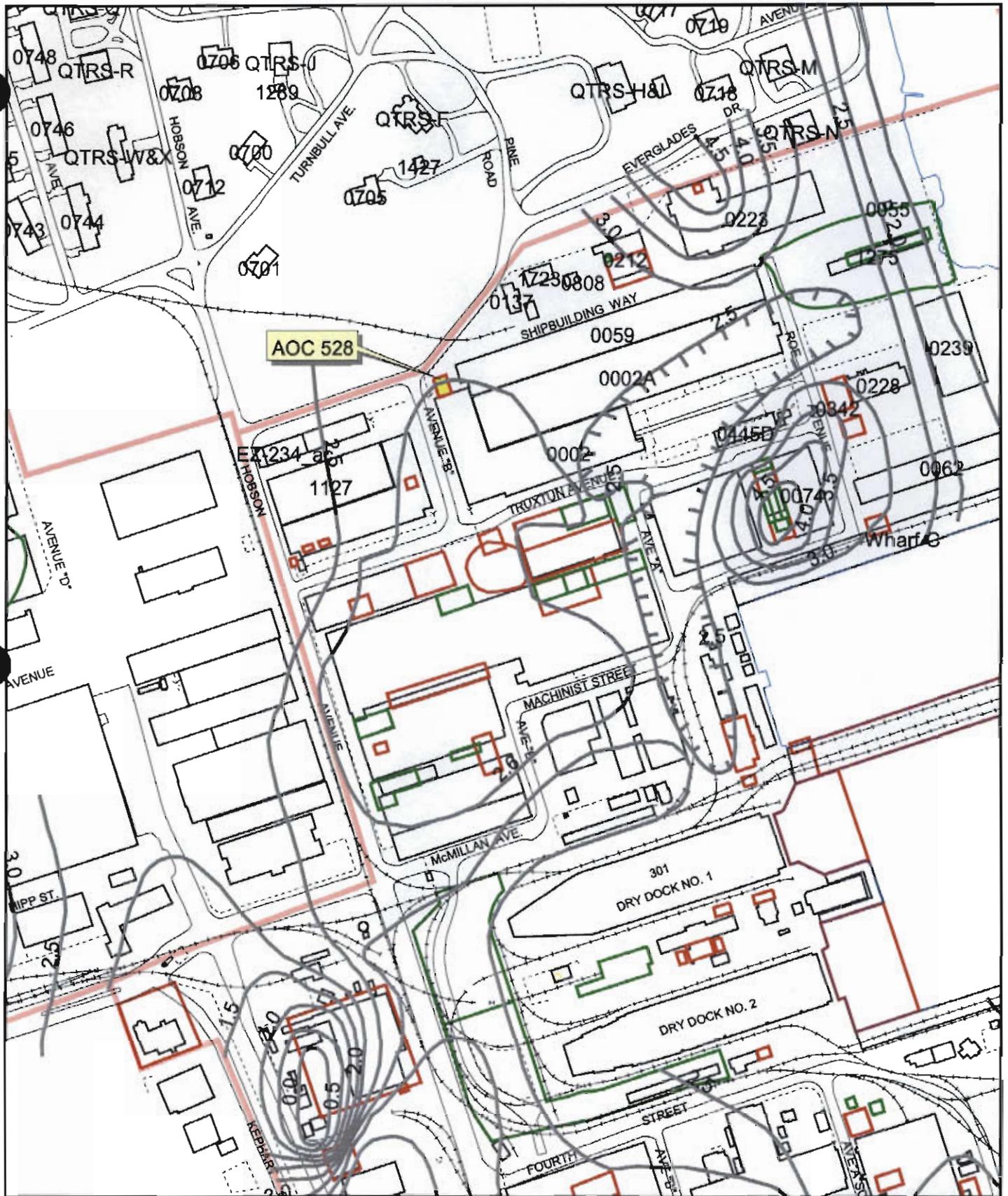
Table 10.20.B
Point Estimates of Risk and Hazard - Surface Soil Pathways
Residential Scenario
AOC 528
NAVBASE-Charleston
Charleston, South Carolina

Site	Location	Parameter	Concentration	Units	Risk (E-06)	% Risk	Hazard Index	% HI
528	B001	<u>B(a)P Equiv.</u>	ND	UG/KG	<u>NA</u>		<u>NA</u>	
		Total			NA		NA	
528	B002	<u>B(a)P Equiv.</u>	123.02	UG/KG	<u>2.0372</u>	100.00	<u>NA</u>	
		Total			2.0372		NA	
528	B003	<u>B(a)P Equiv.</u>	ND	UG/KG	<u>NA</u>		<u>NA</u>	
		Total			NA		NA	
528	B004	<u>B(a)P Equiv.</u>	ND	UG/KG	<u>NA</u>		<u>NA</u>	
		Total			NA		NA	

Table 10.20.C
 Chemical Present in Site Samples
 AOC 528 - Groundwater
 NAVBASE - Charleston, Zone E
 Charleston, South Carolina

Parameter	Frequency of Detection		Range of Detection		Average Detected Concentration	Range of SQL		Screening Concentration		Units	Number Exceeding RBC Ref.	
								Residential RBC	Reference		RBC	Ref.
Shallow Wells												
Inorganics												
Arsenic (As)		1	1	3.1	3.1	3.1	NA	NA	0.045	18.7	UG/L	1
Calcium (Ca)	N	1	1	136000	136000	136000	NA	NA	NA	NA	UG/L	
Iron (Fe)	N	1	1	4410	4410	4410	NA	NA	NA	NA	UG/L	
Magnesium (Mg)	N	1	1	34200	34200	34200	NA	NA	NA	NA	UG/L	
Manganese (Mn)		1	1	518	518	518	NA	NA	84	2560	UG/L	1
Nickel (Ni)		1	1	3.1	3.1	3.1	NA	NA	73	15.2	UG/L	
Potassium (K)	N	1	1	15800	15800	15800	NA	NA	NA	NA	UG/L	
Vanadium (V)		1	1	2.1	2.1	2.1	NA	NA	26	11.4	UG/L	

N - Essential nutrient
 SQL - Sample quantitation limit
 NA - Not applicable
 UG/L - Micrograms per liter



- Shallow Groundwater Contours ft bls
- Fence
- Railroads
- Roads
- AOC Boundary
- SWMU Boundary
- Buildings
- Zone Boundary

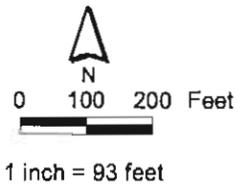


Figure A-1
 Shallow Groundwater Contour Map
 AOC 528, Zone E
 Charleston Naval Complex

**Response To Comments from Charles B. Watson, (SCDHEC),
Draft Zone E RCRA Facility Investigation Report , Charleston Naval Complex**

AOC 528

Comment 12

Benzo(a)pyrene equivalents, arsenic, and beryllium were detected above the residential RBC in surface soil and should be evaluated. Sediment samples from 528M0001 exhibited levels of BEQs, pesticides and metals above the residential RBC and should be evaluated.

Navy/EnSafe Response:

Benzo(a)pyrene equivalents were detected in one sample at a concentration above its residential RBC but well below its industrial RBC. Arsenic and beryllium were detected at concentrations above their respective RBCs but were well below their respective background reference concentrations. The sediment sample from the catch basin did exhibit elevated concentrations of metals, pesticides, and BEQs, however, this catch basin was cleaned during interim measures conducted by the Environmental Detachment Charleston. Details of the cleaning can be found in the Closure Report for AOC 699 Storm Drain Cleaning prepared on March 8, 1999.

CH2M-Jones Response:

No additional response.